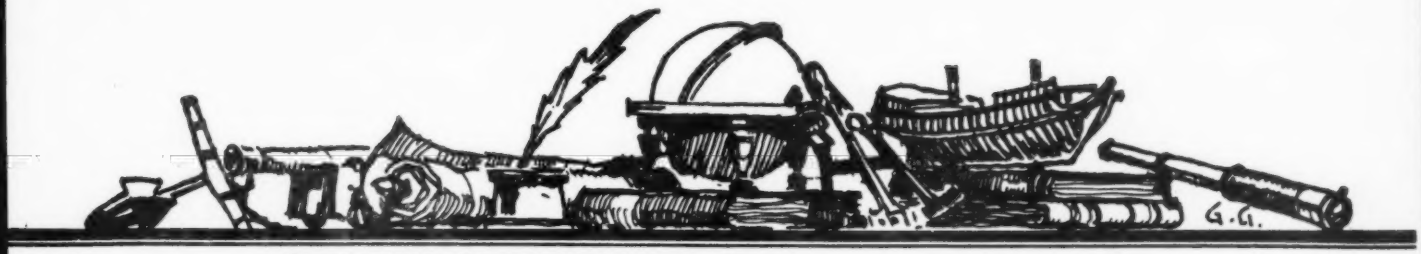

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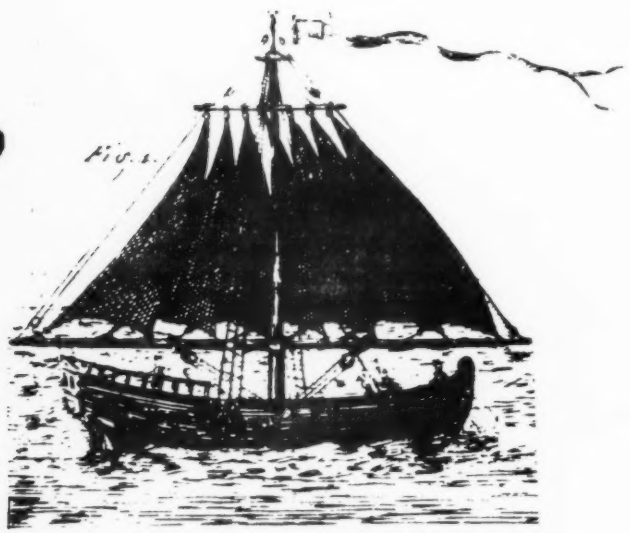
THE MARITIME OBSERVATIONS OF BENJAMIN FRANKLIN

INTRODUCTION



The career and accomplishments of Benjamin Franklin (1706 - 1709) in the diverse fields of statesmanship, science, writing and government are fairly well known to nearly everyone. Not so well known, however, is his interest in nautical matters. A glance at Franklin's record in public life will reveal a considerable knowledge of nautical affairs in connection with his voting for the building of a Continental Navy, his work in France to outfit privateers, his encouragement of John Paul Jones and, finally, his efforts resulting in the French naval aid which ended the Revolutionary War.

Franklin made eight crossings of the Atlantic which gave him a good bit of leisure time aboard ship. His innate curiosity about things seen around him and from talks with his seafaring friends set his genius to work on the every-day problems confronting mariners in the handling of ships and gear. On these voyages he studied the Gulf Stream by taking sea water temperatures and later drew the first chart showing the course of the stream. While in England in 1773 he participated in experiments concerned with the spreading oil on the water to cut down breaking waves for possible use in Life-Saving operations. In 1768 he made "tank test" experiments showing the drag caused by canal boat hulls passing through shoal water.

His thoughts on a number of nautical matters have been preserved in a letter to his friend Julien-David Le Roy, a French scientist. This letter was written "at sea, on board the London Packet, Capt. Truxtun, August 1783" and has come to be known as the "Maritime Observations". It was accompanied by a sketch to illustrate the various points brought out. Later read before the American Philosophical Society of Philadelphia it was published in their "Transactions, Vol. II".

Modern readers may disagree with some of Franklin's conclusions, but it must be remembered that when he wrote in 1783 present day methods, equipment and knowledge had not yet material-

ized. His approach to the subject possibly may best be expressed by Franklin himself when he wrote, ".....as I may never have another occasion of writing on this subject, I think I may as well now, once for all, empty my nautical budget and give you all the thoughts that have in my various long voyages occurred to me relating to navigation. I am sure that in you they will meet with a candid judge, who will excuse my mistakes on account of my good intention."

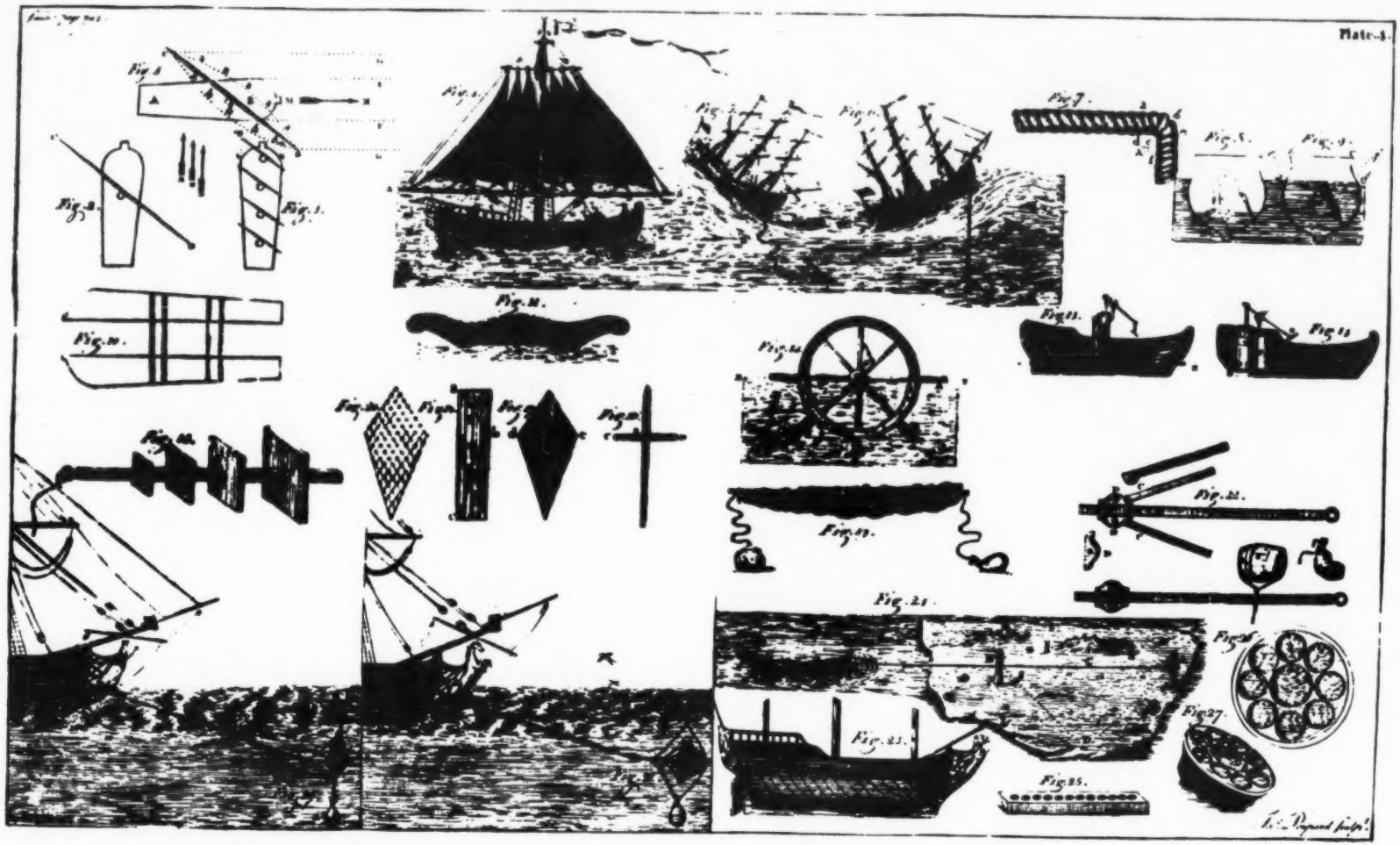
Lack of space prevents the publication here of all of Franklin's "Observations". However we have selected a large number of the topics he considered, omitting his remarks on the Gulf Stream which have been repeatedly quoted in recent publications, his advice to persons about to embark on a voyage, food on board ship and several other odds and ends which seemingly have little interest today. The topic headings are ours and do not appear in Franklin's letter. - F.J.Watson, Jr.

SAILS

"Those mathematicians who have endeavoured to improve the swiftness of vessels, by calculating to find the form of least resistance, seem to have considered a ship as a body moving through one fluid only, the water; and to have given little attention to the circumstances of her moving through another fluid, the air. It is true that when a vessel sails right before the wind, this circumstance is of no importance, because the wind goes with her; but in every deviation from that course, the resistance of the air is something, and becomes greater in proportion as that deviation increases. I waive at present the consideration of those different degrees of resistance given by the air to that part of the hull which is above water, and confine myself to that given by the sails; for their motion through the air is resisted by the air, as the motion of the hull through the water is resisted by the water, though with less force as the air is a lighter fluid. And to simplify the discussion as much as possible, I would state one situation only, to wit, that of the wind upon the beam, the ship's course being directly across the wind; and I would suppose the sail set in an angle of 45 degrees with the keel, as in the following figure; wherein A B represents the body of the vessel, C D the position of the sail, E E E the direction of the wind, M M the line of motion. In observing this figure it will appear, that so much of the body of the vessel as is immersed in the water, must to go forward, remove out of the way what water it meets with between the pricked lines F F. And the sail, to go forward, must move out of the way all the air its whole dimension meets with between the pricked lines C G and D G. Thus both the fluids give resistance to the motion, each in proportion to the quantity of matter contained in the dimension to be removed. And though the air is vastly lighter than the water, and therefore more easily removed, yet the dimension being much greaterits effect is very considerable.

"It is true that in the case stated, the resistance given by the air between those lines to the motion of the sail is not apparent to the eye, because the greater force of the wind which strikes it in the direction E E E, overpowers its effect, and keeps the sail full in the curve, a, a, a, a. But suppose the wind to cease, and the vessel in a calm to be impelled with the same swiftness by oars, the sail would then appear filled in the contrary curve b, b, b, b, b, when prudent men would immediately perceive that the air resisted its motion, and would order it to be taken in.

"Is there any possible means of diminishing this resistance, while the same quantity of sail is exposed to the wind, and therefore the same force obtained from it? I think there is, and that it may be done by dividing the sail into a number of parts, and placing those parts in a line one behind the other; thus instead of one sail extending from C to D, figure 2, if four sails containing together the same quantity of canvas, were placed as in figure 3, each having one quarter of the dimensions of the great sail, and exposing a quarter of its surface to the wind, would give a quarter of the force; so that the whole force obtained from the wind would be the same, while the resistance from the air would be nearly reduced to the space between the pricked lines a b and c d, before the foremost sail.



Franklin's Diagram to Illustrate the Maritime Observations

Courtesy of the American Philosophical Society

"It may be perhaps doubted whether the resistance from the air would be so diminished; since possibly each of the following small sails having also air before it, which must be removed, the resistance on the whole would be the same.

"This then is a matter to be determined by experiment. I will mention one that I many years since made with success for another purpose; and I will propose another small one easily made. If that too succeeds, I should think it worth while to make a larger, though at some expense, on a river boat; and perhaps time and the improvements experience will afford, may make it applicable with advantage to larger vessels.

"Having near my kitchen chimney a round hole of eight inches diameter, through which was a constant steady stream of air, increasing or diminishing only as the fire increased or diminished, I contrived to place my jack so as to receive that current; and taking off the flyers, I fixed in their stead on the same pivot a round tin plate of near the same diameter with the hole; and having cut it in radial lines almost to the center, so as to have six equal vanes, I gave to each of them the obliquity of forty-five degrees. They moved round, without the weight, by the impression only of the current of air, but too slowly for the purpose of roasting. I suspected that the air struck by the back of each vane might possibly by its resistance retard the motion, and to try this, I cut each of them into two, and I placed the twelve, each having the same obliquity, in a line behind each other, when I perceived a great augmentation in its velocity, which encouraged me to divide them once more, and. continuing the same obliquity, I placed the twenty-four behind each other in a line, when the force of the wind being the same, and the surface of vane the same, they moved round with much greater rapidity, and perfectly answered my purpose.

"The second experiment I propose, is, to take two playing cards of the same dimensions and cut one of them transversely into eight equal pieces; then with a needle string them upon two threads one near each end, and place them so upon the threads that, when hung up, they may be one exactly above the other, at a distance equal to their breadth, each in a horizontal position; and let a small weight, such as a bird-shot, be hung under them, to make them fall in a straight line when let loose. Suspend also the whole card by threads from its four corners, and hang to it an equal weight, so as to draw it downwards when let fall, its whole breadth pressing against the air. Let those two bodies be attached, one of them to one end of a thread a yard long, the other to the other end. Extend a twine under the ceiling of a room, and put through it at thirty inches distance two pins bent in the form of fishhooks. On these two hooks hang the two bodies, the thread that connects them extending parallel to the twine, which thread being cut, they must begin to fall at the same instant. If they take equal time in falling to the floor, it is a proof that the resistance to the air is in both cases equal. If the whole card requires a longer time, it shows that the sum of the resistances to the pieces of the cut card is not equal to the resistance of the whole one. (Footnote - The motion of the vessel made it inconvenient to try this simple experiment, at sea, when the proposal of it was written. But it has been tried since we came on shore, and succeeded as the other.)

"This principle so far confirmed, I would proceed to make a larger experiment, with a shallop, which I would rig in this manner.

"A B is a long boom, from which are hoisted seven jibs, a, b, c, d, e, f, g, each a seventh part of the whole dimensions, and as much more as will fill the whole space when set in an angle of forty-five degrees, so that they may lap when going before the wind, and hold more wind when going large. Thus rigged, when going right before the wind, the boom should be brought at right angles with the keel, by means of the sheet ropes C D, and all the sails hauled flat to the boom.

"These positions of boom and sails to be varied as the wind quarters. But when the wind is on the beam, or when you would turn to windward, the boom is to be hauled right fore and aft, and the sails trimmed accordingly as the wind is more or less against your course.

"It seems to me that the management of a shallop so rigged would be very easy, the sails being run up and down separately, so that more or less sail may be made at pleasure; and I imagine, that there being full as much sail spread to the force of the wind which im-

pells the vessel in its course, as if the whole were in one piece, and the resistance of the dead air against the foreside of the sail being diminished, the advantage of swiftness would be very considerable; besides that the vessel would lie nearer the wind.

HAWSE-HOLES

"Being, in one of my voyages, with ten merchant ships under convoy of a frigate at anchor in Torbay, waiting for a wind to go to the westward; it came fair, but brought in with it a considerable swell. A signal was given for weighing, and we all put to sea together; but three of the ships left their anchors, their cables parting just as the anchors came apeak. Our cable held, and we got up our anchor; but the shocks the ship felt before the anchor got loose from the ground, made me reflect on what might possibly have caused the breaking of the other cables; and I imagined it might be the short bending of the cable just without the hawse-hole, from a horizontal to an almost vertical position, and the sudden violent jerk it receives by the rising of the head of the ship on the swell of a wave while in that position. For example, suppose a vessel hove up so as to have her head nearly over her anchor, which still keeps its hold, perhaps in a tough bottom; if it were calm, the cable still out would form a nearly perpendicular line, measuring the distance between hawse-hole and anchor; but if there is a swell, her head in the trough of the sea would fall below the level, and when lifted on the wave will be as much above it. In the first case the cable will hang loose and bend perhaps as in figure 5. In the second case, figure 6, the cable will be drawn straight with a jerk, must sustain the whole force of the rising ship, and must either loosen the anchor, resist the rising force of the ship, or break. But why does it break at the hawse-hole?

"Let us suppose it is a cable of three inches diameter, and represented by figure 7. If this cable is to be bent round the corner A, it is evident that either the part of the triangle contained between the letters a, b, c, must stretch considerably, and those most that are nearest the surface; or that the parts between d, e, f, must be compressed; or both, which most probably happens. In this case the lower half of the thickness affords no strength against the jerk, it not being strained, the upper half bears the whole, and the yarns near the upper surface being first and most strained, break first and the next yarns follow; for in this bent situation they cannot bear the strain all together, and each contribute its strength to the whole, as they do when the cable is strained in a straight line.

"To remedy this, methinks, it would be well to have a kind of large pulley wheel, fixed in the hawse-hole, suppose of two feet diameter, over which the cable might pass; and being there bent gradually to the round of the wheel, would thereby be more equally strained, and better able to bear the jerk, which may save the anchor, and by that means in the course of the voyage may happen to save the ship.

LEAKING SHIPS

"I have been a reader of newspapers now near seventy years, and I think few years pass without an account of some vessel met with at sea, with no soul on board, and so many fee of water in her hold, which vessel has nevertheless been saved and brought into port; and when not met with at sea, such forsaken vessels have often come ashore on some coast. The crews who have taken to their boats and thus abandoned such vessels, are sometimes met with and taken up at sea by other ships, sometimes reach a coast, and are sometimes never heard of. Those that give an account of quitting their vessels, generally say, that she sprung a leak, that they pumped for some time, that the water continued to rise upon them, and that despairing to save her, they had quitted her lest they should go down with her. It seems by the event that this fear was not always well founded, and I have endeavoured to guess at the reason of the people's too hasty discouragement.

"When a vessel springs a leak near her bottom, the water enters with all the force given by the weight of a column of water, without, which force is in proportion to the difference of level between the water without and that within. It enters therefore with more force at first, and in greater quantity, than it can afterwards when the water within is higher. The bottom of the vessel too is narrower, so that the same quantity coming into that narrow part, rises faster than when the space for it to flow in is larger. This helps to terrify. But as the quantity entering is less and less as the surfaces without

and within become more nearly equal in height, the pumps that could not keep the water from rising at first, might afterwards be able to prevent its rising higher, and the people might have remained on board in safety, without hazarding themselves in an open boat on the wide ocean. (figure 8)

"Besides the greater equality in the height of the two surfaces, there may sometimes be other causes that retard the farther sinking of a leaky vessel. The rising water may arrive at quantities of light wooden work, empty chests, and particularly empty water casks, which if fixed so as not to float themselves may help to sustain her. Many bodies which compose a ship's cargo may be specifically lighter than water, all these when out of water are an additional weight to that of the ship, and she is in proportion pressed deeper into the water; but as soon as these bodies are immersed, they weigh no longer on the ship, but on the contrary, if fixed, they help to support her, in proportion as they are specifically lighter than the water. And it should be remembered that the largest body of a ship may be so balanced in the water, than an ounce less or more of weight may leave her at the surface or sink her to the bottom. There are also certain heavy cargoes, that when the water gets at them are continually dissolving, and therefore lightening the vessel, such as salt and sugar. And as to water casks mentioned above, since the quantity of them must be great in ships of war where the number of men consume a great deal of water every day, if it had been made a constant rule to bung them up as fast as they were emptied, and to dispose the empty casks in proper situations, I am persuaded that many ships which have been sunk in engagements, or have gone down afterwards, might with the unhappy people have been saved; as well as many of those which in the last war foundered, and were never heard of. While on this topic of sinking, one cannot help recollecting the well known practice of the Chinese, to divide the hold of a great ship into a number of separate chambers by partitions tight caulked, (of which you gave a model in your boat upon the Seine) so that if a leak should spring in one of them the others are not affected by it; and though that chamber should fill to a level with the sea, it would not be sufficient to sink the vessel. We have not imitated this practice. Some little disadvantage it might occasion in the stowage is perhaps one reason, though I think might be more than compensated by an abatement in the insurance that would be reasonable, and by a higher price taken of passengers, who would rather prefer going in such a vessel. But our seafaring people are brave, despite danger, and reject such precautions of safety, being cowards only in one sense, that of fearing to be thought afraid.

SAIL CARRYING AND CAPSIZE

"To that of oversetting, privateers in their first cruise have, as far as has fallen within my knowledge or information, been more subject than any other kind of vessels. The double desire of being able to overtake a weaker flying enemy, or to escape when pursued by a stronger, has induced the owners to overmast their cruisers, and to spread too much canvas; and the great number of men, many of them not seamen, who being upon deck when a ship heels suddenly are huddled down to leeward, and increase by their weight the effect of the wind. This therefore should be more attended to and guarded against, especially as the advantage of lofty masts is problematical. For the upper sails have greater power to lay a vessel more on her side, which is not the most advantageous position for going swiftly through the water. And hence it is that vessels which have lost their lofty masts and been able to make little more sail afterwards than permitted the ship to sail upon an even keel, have made so much way, even under jury masts, as to surprise the mariners themselves. But there is besides, something in the modern form of our ships that seems as if calculated expressly to allow their oversetting more easily. The sides of a ship instead of spreading out as they formerly did in the upper works are of late years turned in, so as to make the body nearly round, and more resembling a cask. I do not know what the advantages of this construction are, except that such ships are not so easily boarded. To me it seems a contrivance to have less room in a ship at nearly the same expense. For it is evident that the same timber and plank consumed in raising the sides from a to b, and from c to d, would have raised them from a to 3, and from d to f, fig. 9. In this form all the spaces between e, a, b, and c, d, f, would have been gained, the deck would have been larger, the men would have had more room to act, and not have stood so thick in the way of the enemy's shot; and the vessel the more she was laid down on her side, the more bearing she would meet with, and more effectual to support her, as being farther from the center. Whereas in the present form, her ballast makes the chief part of her bearing,

without which she would turn in the sea almost as easily as a barrel. More ballast by this means becomes necessary, and that sinking a vessel deeper in the water occasions more resistance to her going through it. The Bermudian sloops still keep with advantage to the old spreading form, the Islanders in the great Pacific Ocean, though they have no large ships, are the most expert boatsailors in the world, navigating that sea safely with their proas, which they prevent oversetting by various means. Their sailing proas for this purpose have outriggers generally to windward, above the water, on which one or more men are placed to move occasionally further from or nearer to the vessel as the wind freshens or slackens. But some have their outriggers to leeward, which resting on the water support the boat so as to keep her upright when pressed down by the wind. Their boats moved by oars rather than paddles are, for long voyages, fixed two together by cross bars of wood that keep them at some distance from each other, and so render their oversetting next to impossible. How far this may be practical in larger vessels, we have not yet sufficient experience. I know of but one trial made in Europe, which was about one hundred years since by Sir William Petty. He built a double vessel, to serve as a pacquet boat between England and Ireland. Her model still exists in the Museum of the Royal Society, where I have seen it. By the accounts we have of her, she answered well the purpose of her construction, making several voyages; and though wrecked at last by a storm, the misfortune did not appear owing to her particular construction, since many other vessels of the common form were wrecked at the same time. The advantage of such a vessel is: that she needs no ballast, therefore swims either lighter or will carry more goods; and that passengers are not so much incommoded by her rolling; to which may be added, that if she is to defend herself by her cannon, they will probably have more effect, being kept more generally in a horizontal position, than those in common vessels. I think however that it would be an improvement of that model, to make the sides which oppose each other perfectly parallel, though the other sides are formed as in common thus, figure 10. The building of a double ship would indeed be more expensive in proportion to her burthen; and that is perhaps sufficient to discourage the method.

FIRE AT SEA

"The accident of fire is generally well guarded against by the prudent captain's strict orders against smoking between decks, or carrying a candle there out of a lanthorn. But there is one dangerous practice which frequent terrible accidents have not yet been sufficient to abolish; that of carrying store-spirits to sea in casks. Two large ships, the SERAPHIS and the DUKE OF ATHOL, one an East-Indiaman, the other a frigate, have been burnt within these last two years, and many lives miserably destroyed, by drawing spirits from a cask near a candle. It is high time to make it a general rule, that all the ship's store of spirits should be carried in bottles.

LIGHTNING

"The misfortune by a stroke of lightning I have in my former writings endeavoured to show a method of guarding against, by a chain and pointed rod, extending, when run up, from above the top of the mast to the sea. These instruments are now made and sold at a reasonable price by Nairne & Co. in London, and there are several instances of success attending the use of them. They are kept in a box, and may be run up and fixed in about five minutes, on the approach of a thunder gust.

COLLISION - WITH SHIPS AND ICEBERGS

"Of the meeting and shocking with other ships in the night, I have known two instances in voyages between London and America. In one both ships arrived though much damaged, each reporting their belief what the other must have gone to the bottom. In the other, only one got to port; the other was never afterwards heard of. These instances happened many years ago when the commerce between Europe and America was not a tenth part of what it is at present, ships of course thinner scattered, and the chance of meeting proportionably less. It has long been the practice to keep a lookout before in the channel, but at sea it has been neglected. If it is not at present thought worthwhile to take that precaution, it will in time become more consequence; since the number of ships at sea is continually augmenting. A drum frequently beat or a bell rung on a dark night, might help to prevent such accidents.

"Islands of ice are frequently seen off the banks of Newfoundland, by ships going between North America and Europe. In the day-time they are easily avoided, unless in a very thick fog. I remember two instances of ships running against them in the night. The first lost her bowsprit, but received little other damage. The other struck where the warmth of the sea had wasted the ice next to it, and a part hung over above. This perhaps saved her, for she was under great way; but the upper part of the cliff taking her foretopmast, broke the shock, though it carried away the mast. She disengaged herself with some difficulty, and got safe into port; but the accident shows the possibility of other ships being wrecked and sunk by striking those vast masses of ice, of which I have seen one that we judged to be seventy feet high above water, consequently eight times as much under water; and it is another reason for keeping a good lookout before, though far from any coast that may threaten danger.

PRIMITIVE WATERCRAFT

"It is remarkable that the people we consider savages have improved the art of sailing and rowing boats in several points beyond what we can pretend to. We have no sailing boats equal to the flying-proas of the South Seas, no rowing or paddling boat equal to that of the Greenlanders for swiftness and safety. The birch canoes of the North American Indians have also some advantageous properties. They are so light that two men can carry one of them over land, which is capable of carrying a dozen upon the water; and in heeling they are not so subject to take in water as our boats, the sides of which are lowest in the middle where it is most likely to enter, this being the highest part, as in figure 11.

"The Chinese are an enlightened people, the most anciently civilized of any existing, and their arts are ancient, a presumption in their favour; their method of rowing their boats differs from ours, the oars being worked either two astern as we scull, or on the sides with the same kind of motion, being hung parallel to the keel on a rail and always acting in the water, not perpendicular to the side as ours are, nor lifted out at every stroke, which is a loss of time, and the boat in the interval loses motion. They see our manner, and we theirs, but neither are disposed to learn of or copy the other.

PROPELLERS

"To the several ways of moving boats mentioned above, may be added the singular one lately exhibited at Javelle, on the Seine below Paris, where a clumsy boat was moved across that river in three minutes by rowing, not in the water, but in the air, that is, by whirling round a set of windmill vanes fixed to a horizontal axis, parallel to the keel, and placed at the head of the boat. The axis was bent into an elbow at the end, by the help of which it was turned by one man at a time. I saw the operation at a distance. The four vanes appeared to be about five feet long, and perhaps two and a half wide. The weather was calm, the labour appeared to be great for one man, as the two several times relieved each other. But the action upon the air by the oblique surfaces of the vanes must have been considerable, as the motion of the boat appeared tolerably quick going and returning; and she returned to the same place from whence she first set out, notwithstanding the current. This machine is since applied to the moving of air balloons. An instrument similar may be contrived to move a boat by turning under water.

PADDLE WHEELS

"Several mechanical projectors have at different times proposed to give motion to boats, and even to ships, by means of circular rowing, or paddles placed on the circumference of wheels to be turned constantly on each side of the vessel; but this method, though frequently tried, has never been found so effectual as to encourage a continuance of the practice. I do not know that the reason has hitherto been given. Perhaps it may be this, that great part of the force employed contributes little to the motion. For instance, (figure 12) of the four paddles a, b, c, d, all under water, and turning to move a boat from X to Y, c-has the most power, b-nearly though not quite as much, their motion being nearly horizontal, but the force employed in moving a, is consumed in pressing upon the water till it comes to the place of b; and the force employed in moving d is consumed in lifting the water till d arrives at the surface; by which means much of the labour is lost. It is true that by placing the wheels higher out of the water, this waste labour

will be diminished in a calm, but where a sea runs, the wheels must unavoidably be often dipt deep in the waves, and the turning of them thereby rendered very laborious to little purpose.

SKIN FRICTION

"To obtain more swiftness, greasing the bottom of a vessel is sometimes used, and with good effect. I do not know that any writer has hitherto attempted to explain this. At first sight one would imagine, that though the friction of a hard body sliding on another hard body, and the resistance occasioned by that friction, might be diminished by putting grease between them, yet that a body sliding on a fluid, such as water, should have no need of nor receive any advantage from such greasing. But the fact is not disputed. And the reason may be this. The particles of water have mutual attraction, called the attraction of adhesion. Water also adheres to wood, and to many other substances, but not to grease. On the contrary they have a mutual repulsion, so that it is a question whether when oil is poured on water, they ever actually touch each other; for a drop of oil upon water, instead of sticking to the spot where it falls, as it would if it fell on a looking glass, spreads instantly to an immense distance in a film extremely thin, which it could not easily do if it touched and rubbed or adhered even in a small degree to the surface of the water. Now the adhesive force of water to itself, and to other substances, may be estimated from the weight of it necessary to separate a drop, which adheres, while growing, till it has weight enough to force the separation and break the drop off. Let us suppose the drop to be the size of a pea, then there will be as many of these adhesions as there are drops of that size touching the bottom of a vessel, and these must be broken by the moving power, every step of her motion that amounts to a drop's breadth; and there being no such adhesions to break between the water and a greased bottom, may occasion the difference.

SEA ANCHORS

"So much respecting the motion of vessels. But we have sometimes occasion to stop their motion; and if a bottom is near enough we can cast anchor. Where there are no soundings, we have as yet no means to prevent driving in a storm, but by lying-to, which still permits driving at the rate of about two miles an hour; so that in a storm continuing fifty hours, which is not an uncommon case, the ship may drive one hundred miles out of her course; and should she in that distance meet with a lee shore, she may be lost.

"To prevent this driving to leeward in deep water, a swimming anchor is wanting, which ought to have these properties:

1. It should have a surface so large as being at the end of a hawser, in the water, and placed perpendicularly, should hold so much of it, as to bring the ship's head to the wind, in which situation the wind has least power to drive her.
2. It should be able by its resistance to prevent the ship's receiving way.
3. It should be capable of being situated below the heave of the sea, but not below the undertow.
4. It should not take up much room in the ship.
5. It should be easily thrown out, and put into its proper situation.
6. It should be easy to take in again, and stow away.

"An ingenious old mariner whom I formerly knew, proposed as a swimming anchor for a large ship to have a stem of wood twenty-five feet long and four inches square, with four boards of 18, 16, 14 and 12 feet long, and one foot wide, the boards to have their substance thickened several inches in the middle by additional wood, and to have each a four inch square hole through its middle, to permit its being slipt on occasionally upon the stem, and at right angles to it; where all being placed and fixed at four feet distance from each other, it would have the appearance of the old mathematical instrument called a forestaff. This thrown into the sea, and held by a hawser veered out some length, he conceived would bring a vessel up, and prevent her from driving, and when taken in might be stowed away by separating the boards from the stem. Figure 15. Probably such a swimming anchor would have good effect, but it is subject to this objection,

that lying on the surface of the sea, it is liable to be hove forward by every wave, and thereby give so much leave for the ship to drive.

"Two machines for this purpose have occurred to me, which though not so simple as the above, I imagine would be more effectual, and more easily manageable. I will endeavour to describe them, that they may be submitted to your judgment, whether either would be serviceable; and if they would, to which we should give the preference.

"The first is to be formed, and to be used in the water on almost the same principles with those of a paper kite used in the air. Only as the paper kite rises in the air, this is to descend in the water. Its dimensions will be different for ships of different size.

"To make one of suppose fifteen feet high; take a small spar of that length for the backbone, A B, figure 16, a smaller one of half that length C D, for the cross piece. Let these be joined by a bolt at E, yet so as that by turning on the bolt they may be laid parallel to each other. Then make a sail of strong canvas, in the shape of figure 17. To form this, without waste of sail cloth, sew together pieces of the proper length, and for half the breadth, as in figure 18, then cut the whole in the diagonal lines a, b, c, and turn the piece F so as to place its broad part opposite to that of the piece G, and the piece H in like manner opposite to I, which when all sewed together will appear as in figure 17. This sail is to be extended on the cross of figure 16, the top and bottom points well secured to the ends of the long spar; the two side points d, e, fastened to the ends of two cords, which coming from the angle of the loop (which must be similar to the loop of a kite) pass through two rings at the ends of the short spar, so as that on pulling upon the loop the sail will be drawn to its extent. The whole may, when aboard, be furled up, as in figure 19, having a rope from its broad end, to which is tied a bag of ballast for keeping that end downwards when in the water, and at the other end another rope with an empty keg at its end to float on the surface; this rope long enough to permit the kite descending into the undertow, or if you please lower into still water. It should be held by a hawser. To get it home easily, a small loose rope may be veered but with it, fixed to the keg. Hauling on that rope will bring the kite home with small force, the resistance being small as it will then come endways.

"It seems probable that such a kite at the end of a long hawser would keep a ship with her head to the wind, and resisting every tug, would prevent her driving so fast as when her side is exposed to it, and nothing to hold her back. If only half the driving is prevented, so that she move but fifty miles instead of the hundred during a storm, it may be some advantage, both in holding so much distance as is saved, and in keeping from a lee shore. If single canvas should not be found strong enough to bear the tug without splitting, it may be doubled, or strengthened by a netting behind it, represented by figure 20.

"The other machine for the same purpose, is to be made more in the form of an unbrella, as represented, figure 21. The stem of the unbrella a square spar of proper length, with four moveable arms, of which two are represented C, C, figure 22. These arms to be fixed in four joint cleats, as D, D, etc., one on each side of the spar, but so as that the four arms may open by turning on a pin in the joint. When open they form a cross, on which a four square canvas sail is to be extended, its corners fastened to the ends of the four arms. Those ends are also to be stayed by ropes fastened to the stem or spar, so as to keep them short of being at right angles with it; and to the end of one of the arms should be hung the small bag of ballast, and to the end of the opposite arm the empty keg. This on being thrown into the sea, would immediately open; and when it had performed its function, and the storm over, a small rope from its other end being pulled on, would turn it, close it, and draw it easily home to the ship. This machine seems more simple in its operation, and more easily manageable than the first, and perhaps may be more effectual. (Footnote - Captain Truxtun, on board whose ship this was written, has executed this purposed machine; he has given six arms to the umbrella, they are joined to the stem by iron hinges, and the canvas is double. He has taken it with him to China, February 1786).

DOUBLE PLANKING

"Would it not be a more secure method of planking ships, if instead of thick single planks laid horizontally, we were to use planks of half the thickness, and lay them double and across each other as in figure 23? To me it seems that the difference of expense would not be considerable, and that the ship would be both tighter and stronger.

MAKE-SHIFTS

"With regard to make-shifts in cases of necessity, seamen are generally very ingenious themselves. They will excuse however the mention of two or three. If they happen in any circumstance, such as after shipwreck, taking to their boat, or the like to want a compass, a fine sewing-needle laid on clear water in a cup will generally point to the north, most of them being a little magnetical, or may be so made by being strongly rubbed or hammered, lying in a north and south direction. If their needle is too heavy to float by itself, it may be supported by little pieces of cork or wood.

"A man who can swim, may be aided in a long traverse by his handkerchief formed into a kite, by two cross sticks extending to the four corners; which being raised in the air, when the wind is fair and fresh, will tow him along while lying on his back.

"Where force is wanted to move a heavy body, and there are but few hands and no machines, a long and strong rope may make a powerful instrument. Suppose a boat is to be drawn up on a beach, that she may be out of the surf, a stake drove into the beach where you would have the boat drawn; and another to fasten the end of the rope to, which comes from the boat, and then applying what force you have to pull upon the middle of the rope at right angles to it, the power will be augmented in proportion to the length of rope between the posts. The rope being fastened to the stake A, and drawn upon in the direction C D, will slide over the stake B; and when the rope is bent to the angle A D B, represented by the pricked line in figure 24, the boat will be at B.

"Some sailors may think the writer has given himself unnecessary trouble in pretending to advise them; for they have a little repugnance to the advice of landsmen, whom they esteem ignorant and incapable of giving any worth notice; though it is certain that most of their instruments were the invention of landsmen. At least the first vessel ever made to go upon the water was certainly such . . . . .

With great esteem, I am, Sir,
Your most obedient humble servant,

B. Franklin.

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GUILD SHIP MODEL REGISTRY
1953 Annual Report of the Registrar
H.S. Scott, 2300 N.E. 22nd Street
Oklahoma City, Oklahoma

We are now entering the third year with the Ship Model Registry, the following list will show that many more models have been added this year.

We wish to call your attention to the importance of this project, the list will be of great assistance to those who not only build the same model, but to those building ships of the same type or era, conversely it shows the most popular models. At least a hundred members have made the same model and one popular model has been made by nine of the members. The registry will also help you sell or trade your model and will be of great assistance to others wanting information.

Space will not permit including the maker's name of each model but the registrar will furnish the name upon request. Please note that the numeral in brackets denotes the number of ships made and registered by different members under the same name. When registering your ships, please use a three by five file card, giving the pertinent features of your model whether planked, framed or coppered, also please give the data on your plans for a list of sources is now being compiled by Mr. Mehrel Shank for the Directory of Ship Model Plans.

THE GUILD SHIP MODEL REGISTRY
1953

NAME OF VESSEL

AGATE, schooner
ALEXANDER HAMILTON
ALICE MANDELL, whaler
AMELIA, sloop
AMERICA, yacht (2)
ANCHOR HOY
ANN McKIM, 1932
ARCHIBALD McMILLAN
ARK ROYAL, 1588
ATLANTIC (2)
AUGUSTA, U.S.CRUISER
Baltimore Privateer
Baltimore Clipper
BENJ. F. PACKARD (2)
BLUENOSE (5)
Boston Light Ship, 1901
BOUNTY (6)
BOUNTY'S Launch
BOXER
BUTESHIRE, barque
CALIPH, clipper
CABOT, brig
CALIFORNIA (2)
CHAMPION of the SEAS,clip.(2)
CHARLES W. MORGAN,whaler(4)
CITY of ADELAIDE
CLAREMONT (2)
Coastguard Cutter,1815
COOLEY Ship
Coastguard Cutter, 1810
CONSTITUTION, frigate (10)
CUTTY SARK (2)
CORONATION
Crusade Ship, 1100 (2)
DIAN, Fr. 44 gun
DILIGENCE (2)
DOS AMIGOS (2)
Dutch Admiralty Yacht (4)
EARL GRANVILLE,iron barque
East Indiaman, Fr.,1760
ELIZABETH, ship
ELSIE, schooner (2)
EMILY WHITNEY
ENTERPRISE, sloop
ESSEX (2)
FAIR AMERICAN
FARRAGUT,USS
Felucca (type)
FERRET, sloop,1711 (2)
FLYING CLOUD (10)
FLYING FISH,McKay Clipper
Foo Chow Junk
FRAM, schooner,1893
GERTRUDE L.THEBAUD (2)
GØOS
GLENORCHY
GOLDEN HIND
GOLDEN WHELP, Br.Bomb Ketch
GRAMPUS, 1822
HALF MOON,1609
HALLIFAX,1765 schooner
HARRIET LANE
HARTFORD, 1858
HISPANIOLA
Horse Power Barge,Fr.1732
ISAAC WEBB,packet (coppered)
JAMES A. WRIGHT (2)
JANE CAMPBELL
JOE LANE,Rev.Cutter(3)
JOHN ADAMS, ship sloop 1830
Junk, Yangtze River
Junk, Foochow
KEARSARGE (2)
KOPENHAVEN
LANCASTER,packet,1810
LECN,Brgntn,Plnk & Frame
LEXINGTON, (2) built up model
LIGHTNING, clipper
LIVELY LADY, topsl.schooner
MAINE, pinkie
MARIE SOPHIE, brig (3)
MARY ASHBURNER, builder's model
MARY E. FOSTER
MAYFLOWER (3) Pilgrim Soc.Plans)
MERRIMAC (Mariners Museum
METEOR, Mcht. Brig
MONITOR
MORRIS, Rev.Cutter(3)
MT. WASHINGTON
NEWSBOY, Brgntn. (2)
NIAGARA, 1812 (2)
NORSKE LØVE,Danish,1625
ORIENT
PENNSYLVANIA, 144 gun (2)
PERRY, brig, 1843
PET, cutter, 1840
PETER STEWART, builders model
Pinky (type)
PLYMOUTH, 1873, sailor's model
PRINCE OF NEWCASTLE, Barkntn.,1812
RAMBLER
RALEIGH, frigate
RAPID, brig, 1826
REBECCA CARUANA, bark,1867
RED JACKET, clipper
Revenue Cutter, H.M. waterline
ROBERT E. LEE
ROBERT MACLEOD, builders model
ROGER B. TANEY
Row Galley, 1805
ROYAL SOVEREIGN, 1639 (2)
SANTA MARIA (5)
SARAH S. RIDGEWAY, barque 1877
Scenic clipper model sailor made
SEA WITCH, clipper (10)
SEEADLER (or PASS of BALMAHA)
SIBYLLE, 1795, bone, cased, for sale
SICAMONS, stern wheeler
SLAVER (type)
ST. PAUL, clipper
Slaver, brig, 1800's
SOVEREIGN OF THE SEAS (9) clip.
SOVEREIGN OF THE SEAS 1637(2)
SPARROWHAWK, KETCH, 1600
SULTANA, Colonial brig
SWALLOW, brgntn.
SWALLOW, Baltimore clip. (2)
SWIFT, sloop
SWORDFISH, clipper (2)
TIGER, pinkie
TORRENS, 1875 (composite plk. with teak)
TORRENS, clipper
Trawler, grand Banks
Trawler, sail
TRIUMPHANT (wooden sails)
T'UNG T'ING Junk
Upper Yangtze Junk
VESONES, barque, plk & rib & frame
VICTORY, HMS, 1805 (4)
Virginia Privateer (type)
VOLANTA, brig
WANDERER, cruiser
WANDER, whaler (3)
WATERWITCH, barkntn, plk and rib and frame
Whaleboat (3)
Whaling barque, coppered, plk & rib
Yacht, Dutch, c. 1620

(continued on p. 29

Schooner "Pinta" on the Great Lakes

By Gerald C. Knewston, Milwaukee

My sailing experiences on a large commercial schooner is limited to a few afternoon sails aboard the ex-Gloucesterman "Pinta". She was brought to the Great Lakes and finally ended up by being purchased for dock charges by the yardman at the Milwaukee Yacht Club. He put in an enormous amount of work on the old girl and there was some talk of taking her to the Gulf of Mexico where she would make the fortunes of everyone concerned with a contract to haul mahogany from Central America to a General Motors auto body plant at New Orleans. This, of course, never materialized and shortly before the beginning of World War II, the ship broke away from her moorings and came ashore at the head of the slip sealing off the Yacht Club docks for most larger boats and almost within spitting distance of the lifeboat station of the Coast Guard. Here, she remained, an embarrassing object lesson to the lookout or tower watch at the lifeboat station, until refloated and towed out into the lake and sunk in deep water.

We small boat sailors who used to moor in the slip itself were often recruited to help get sail on the old girl. They later had a power winch for this, but raising those enormous gaffs, which seemed to be about the size and heft of a telephone pole, took the combined effort of fifteen or twenty of us on a halliard. I have heard it said that three men and a boy could sail a Gloucesterman including getting sail on one, but not us. We evidently did not eat the right kind of beans or fish for breakfast.

The "Pinta" leaked a great deal and until the owners installed a gasoline bilge pump, we occasionally had to man the pumps even on a summer afternoon sail. Every boat I have ever owned has always leaked an inordinate amount (keeps the bilge sweet, settles the dust, etc.) but none of them ever involved the back-breaking labor to a lightly built teenager that the old "Pinta" did. When she was at moorings, the owners used to row around the hull with a box on a long pole and poke the box loaded with a mixture of sawdust and something else down along the seams in the hope that the sawdust would be drawn into the worst of the leaks, swell, and stop the flow of water into the ship.

One of the big problems involved in sailing on the Lakes during July and August is the lack of good steady sailing winds. There are either no winds at all, or there is a hot southwester off the great plains that will blow the hinges off hell. Southwest winds are invariably puffy without too much weight to them and quite unsatisfactory for real small boat sailing. One minute a small craft is straight up and down and will have no way on and the next moment be up to the ears in something perfectly capable of capsizing her or taking out the stick.

However, a big vessel like the "Pinta" could carry her way through the calms between the puffs and once, on such a day, she was entered in a race to Wind Point approximately twenty-five miles up the shore. Small craft warnings were flying from the weather station when most of the competing vessels left harbor under reefed sail or in the cases of real delicate rigs, with trysails up, we were really going to show them some sailing - Gloucester Fisherman style. The "Pinta" easily stormed into the lead and at one time we even ran up the fisherman staysail, but soon took it in as the topmast wasn't properly stayed for such shenanigans. "Pinta" rounded the Wind Point Shoal bouy in the lead, but on the way back, wind gradually lightened, the smaller craft broke out canvas and walked by. The wind not only lightened but headed us and we had to tack immediately on passing through the seawall entrance to the harbor. We gave a lot of Sunday sightseers a thrill as we came about within handshaking distance of the wall.

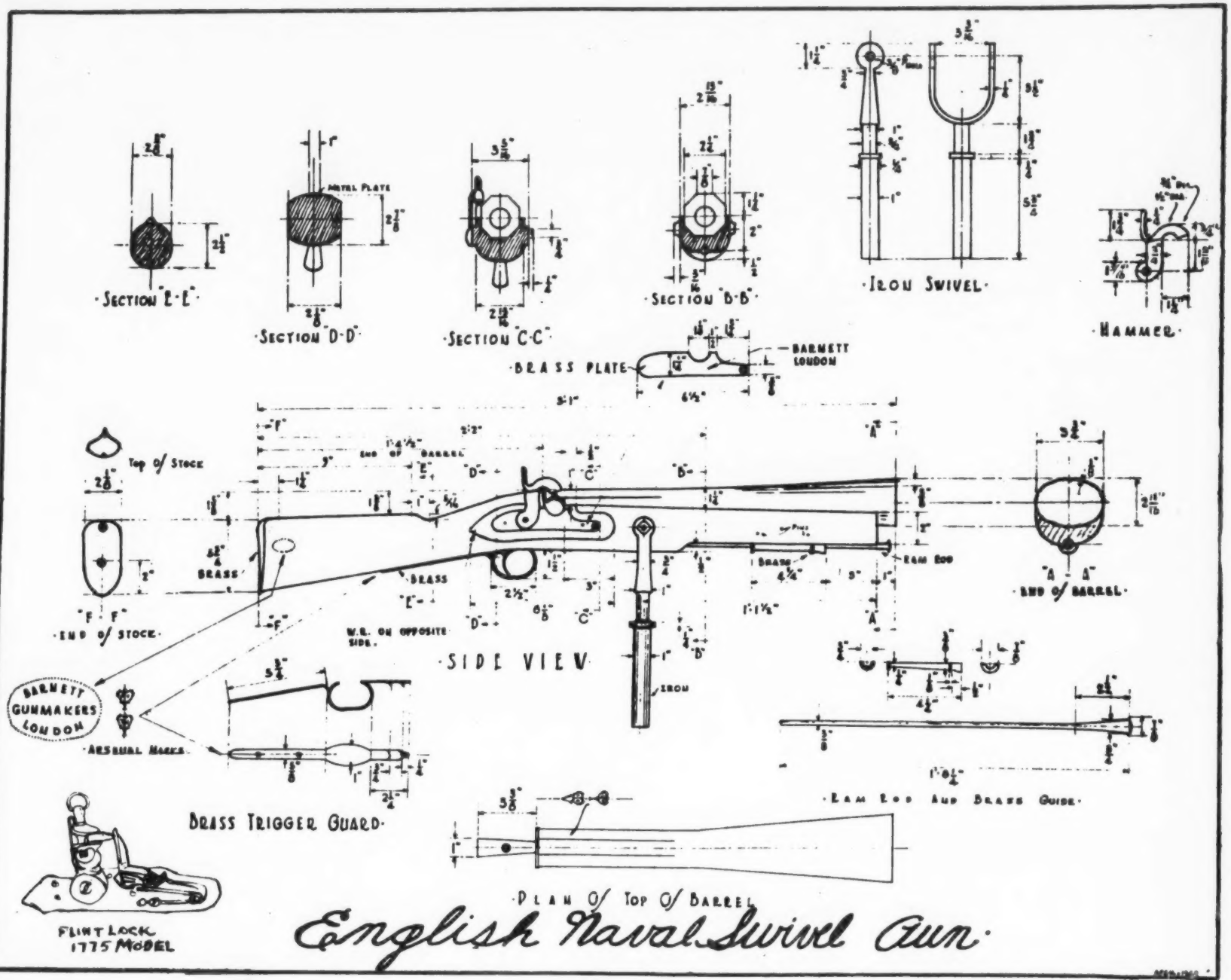
Cont. from p. 28

YARA YARA, builders model Yawl Type

YORK TOWN, a carrier

YOUNG AMERICAN, clipper

100 gun ship, c.1715 British


SECTION E-E
SECTION D-D
METAL PLATE
SECTION C-C
SECTION B-B
IRON SWIVEL
HAMMER
BRASS PLATE
BARNETT LONDON
Top of Stock
END OF BARREL
BRASS
BRASS
END OF STOCK
W.R. ON OPPOSITE SIDE.
SIDE VIEW
IRON
RAM END
BRASS
END OF BARREL
BARNETT GUNMAKERS LONDON
ARSENAL MARKS
BRASS TRIGGER GUARD
RAM END AND BRASS GUIDE
PLAN OF TOP OF BARREL
FLINT LOCK 1775 MODEL
English Naval Swivel Gun.

ENGLISH NAVAL SWIVEL GUN, from Howard A. La Van, Jr. N.R.G.

Some time ago, I was fortunate enough to discover an old English Bell Mouth Blunderbuss that was made available to me for measurement. The subject of such interest that I developed plans with every intention of building a model of the gun, but so far have not found time to do so.

During the period of research, factual data relative to the history and use of similar weapons was contributed by several sources. The Honorable Secretary G. Naish of the Society of Nautical Research (England) wrote: "The blueprints of an old gun indicate the weapon dates from William IV's reign (1830-37). The W.R. would seem to refer to this monarch and the early form of percussion instead of flintlock agrees with this date. The arsenal marks appear correct too.

The firm of Barnett was a famous gunmaker's firm in the Minories. It closed down at the beginning of this century and was turning out primitive weapons for native tribes to the end. Big muskets mounted on swivels so as to fire over ships' rails were favorite ship's armaments during the 18th century but were a little antiquated even with a percussion lock, in 1830. They were capable of discharging quite a load of slugs to repell boarders The bell mouth to the muzzle was typical of this type blunderbuss. It is an interesting example of an early Nordenfield or Lewis gun.

E.N. Rich, N.R.G., contributes the following:

"This type gun was called a blunderbuss - swivel. In 1775, it was fitted with flintlocks and used on privateers and some naval vessels. These were manufactured in the size as shown on the drawing and also in a much heavier model. There are several types on exhibit at the Marine Museum in Mystic, Connecticut, one of which is mounted on a 'Y' swivel with a trunk that can be mounted in the bulwark or handrail of a ship.

During the Revolution and on Lake Champlain, some of the smaller type may have been used, but those which have been recovered are one, two or three pounder small cannon. In those times, swivels were ordered from Salisbury, Connecticut, but few were delivered -- thus forcing the potential customers to use whatever weapons were available. This particular type of gun was on the American market on or about 1830. Percussion caps were of the same type as used on the early Springfield rifles. A copy of the flint lock mechanism is shown in the lower left corner of the drawing. Guns of this type replaced early "Murderers' or 'murtherers' used during the Revolution."

The January Meeting of the Southern California Group

Dr. Ethan Allen Petersen, N.R.G., author of "Hummel Hummel" gave an interesting talk with slides of his 17,000 mile trip across and down the Pacific in a Chinese junk at the home of Harry Hamilton, Sunday, Jan. 31st. He was assisted by his wife who had accompanied him on this epic-making voyage. Dr. Petersen is a member of the Adventurers Club of Los Angeles. He has contributed articles to the National Geographic and other magazines. Dr. Petersen in his youth was a member of the crew of the MOSHULU. Many of the members were glad of the opportunity to obtain autographed copies of the book.

Refreshments were served by Mr. and Mrs. Olav T. Petersen. Mr. Petersen was elected permanent chairman of the Southern California Group.

Three of our local groups are holding periodic meetings. This is fine as far as it goes but we find that they are attended naturally mostly by members who live near by. We cannot expect faraway members to attend these local meetings but we believe that they would attend a local Guild convention. Our group members may pick a suitable time and date for a convention, those who live two or three hundred miles and farther away will be attracted to the meeting. They will at least come once a year and have the pleasure of meeting the other members. Let us consider these conventions seriously.

NAUTICAL RESEARCH GUILD
Dedicated to the Era of Sail
SECRETARY'S MONTHLY LETTER
THE SECRETARY'S MONTHLY LETTER WAS ESTABLISHED IN 1948

THE NAUTICAL RESEARCH JOURNAL is published monthly by the members of the Nautical Research Guild. Membership dues, including the Journal, are $5.00 a year. New members will receive the numbers which have previously been issued in the current volume and the numbers for the remainder of the year.

Dues are payable in January of each year and are in force until the written resignation of a member.

The opinions and assertions in the Journal are the private ones of the writers.

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LETTER TO THE SECRETARY

From Harry Daniel - - Montevideo

About old ships. My great hobby is collecting notes and stores about old ships, and there is no place where there is a comprehensive file containing even thumb-nail histories of all the sailing ships of any nation, let alone a file containing histories of all the ships that sailed in the world. I only wish I had the time to apply myself steadily to compiling a comprehensive reference file, so I could look up the thumb-nail history of any one of the 50,000 sailing ships of which I have notes. But it will take such a long time, and I wonder if I will ever be able to finish it. When you consider there have been thousands of ship names with anything from 10 to 20 ships bearing the same name; and in some cases as many as 160 ships with the same name under the same flag years ago, it takes time to check up on them. I have records of about 50 ships which were named CALEDONIA, and 20 named CALIFORNIA, and about 20 named RED ROVER, and SULTAN, and EMPRESS, etc., etc. Checking up on each, just to note changes of ownership and captains, means checking each ship through 25 or 30 books. It all takes time, and I haven't so much time available now.

Even my friends think I live too much in the past but I think there was more beauty on the Sea in the past than there is today. I remember when I could climb the mast and count as many as 30 white-winged ships of sail scattered over the ocean's blue; and when a sailing ship port like Newcastle, New South Wales, would have 60 or 70 sailing ships in port at a time, with their forest of masts making a wonderful tracery against the sky. When I was in Newcastle in 1900 there were 72 sailing ships there; and in 1907 there were 67; but in 1915 there were only 3, two Chilians and a Norwegian. Sic transit Gloria Marum. The Ship of Sails, the greatest contribution to the beauty of the Sea ever produced by the hand of Man, has sailed away over the horizon into the pages of History, and as the poet Masefield says: "They mark our passage as a race of Men;Earth will not see such Ships as those agen".

GAM CHAIR

We feel that we are justified in being proud of the mimeographic work on the Journal for the past six years by Mrs. Pauline Rogers of the R&S Letter Shop of Whittier; we have received many compliments on the quality of her stenciling work. We are pleased to announce that she has installed an offset equipment which will include offset photo and direct printing. From the pictures in this issue we can be assured of the same high quality of her work with her new equipment.

Once more we take up the subject of dues--dues are the lifeblood of the Journal, without dues we cannot have a healthy, growing Journal. If all the dues came in at once--we would not spend them all at once--BUT at least we would know where we stood. And that is worth a lot when the allotment of the funds must be made for 12 months. All members had notice of this request for dues in the last December issue--this issue will reach you the last of February--that's two months--time enough for a loyal member to pay his dues--how about you? Are your dues overdue?

Harry D. Hamilton

MASTING A MODEL

by John J. Flynn

Much consideration should be given to this operation and plans should be made in advance. If the hull is to be a solid one, either from a block or laminated, this method can be used to get the proper rake to the masts. While the block is still unworked, viz: no sheer or cambre cut, and a flat surface still available, a gauge can be used to guide the boring of the masts. If the hull is to be hollow, the step for the mast can be properly placed on the bottom lift and the deck opening can be located when the deck is laid. On a built hull the step can be located on the keelson before that member is fastened in place.

As to the opening for the bowsprit. It can be round, octagon or square. Bowsprits replaced at sea could be square their entire length. There is a guide that CAN'T be used on all occasions but will work for particular individual models, that is, the steeve of the bowsprit can conform to the sheer of the ship. A ship with slight sheer, the steeve will have to be determined by the builder's judgment. In the early ships the steeve was much greater.

Usually bowsprits were bedded directly over the stem but certain types had the bowsprit bedded along side the stem, could be either port or starboard to suit the needs of being so placed. Boring the hole for a bowsprit in a solid hull calls for judgment and craftsmanship as it is difficult to make a gauge suitable for that particular operation.

Wooden bowsprits were usually square inboard, some octagon outboard for a portion of their length and then rounded or rounded their entire outboard length. The square tenon or steel spike bowsprit was nearly always round. The square tenon on the outboard end of the bowsprit can be cut square to the bowsprit or cut angular, plumb to the surface. This is the tenon on which the cap is mounted. The jibboom on early ships did not always extend back to the ship's bow, ending between the cap and the bow, somewhat on the order of mast doubling. Various wooden block arrangements were used for the jibboom to butt against and lashings were passed around it and the bowsprit to hold it in place. If a flying jibboom was shipped, its cap was set at an angle to one side; Davis, in the "Ship Model Builder's Assistant", said the port side. And a jibboom to the starboard side. These offsets allowed the head stays to come down in line. However the outboard ends of these spars were strained over to line up with the center line of the ship. Some bowsprits were built up and iron banded the same as masts. Before placing these members, check and be sure all eyebolts, bands and other work has been properly done.

The lower masts: I like to make from a square stick. Mark off the length of the head and saw the sides to size with a small saw, also the tenon for the cap. From slightly above deck, if you want to work in this detail, taper the mast moderately to its heel and make it octagon in shape and cut a tenon to fit the step. There is not a great deal of taper to a lower mast, so round it off with whatever tool you favor, such as a coarse file and sandpaper. A plate drill gauge is handy to check the work on the mast as you go along. When the mast is rounded off and you desire to give it the appearance of a built mast, draw four pencil lines, in line with the four corners of the head, from where the lower ends of the cheeks will come down to the deck level. With a small "V" chisel slightly cut a groove along these lines and smooth them with a knife edged file, later when all other work is done the bands will be put on. If you intend to put on a wooden mast coat to cover the deck opening, put it on now as it won't slip over the bottom. Any metal fitting that has to go on the mast below the top should be put on now, such as the cranse or truss iron band and possibly a band for the futtock shrouds if the ship had one.

The truss iron band sometimes served also as a terminal for the futtock shrouds and occasionally a topmast preventer stay from a mast is fastened to it aft. The chain sling for the lower yard may fasten to a hook between the cheeks and below the top or it may go up around the mast head above the top. Fashion and fasten the cheeks in their places. See that their top edges will be level and not square with the rake of the mast. Good insurance to use pins for fastenings and not glue alone.

Now the trestle trees and cross trees and the platform of the top. This work looks nice if made of thin pieces of hard wood. If your drawing does not give you any more than the length of the top, you won't be far wrong if you make the top one third wider than the length; that is, from the Mid-19th century on. If you intend to reeve off the bunt and

leech lines, now is the time to put the eyebolts under the fore rim of the top to which to fasten them. The wooden caps were naturally heavy in order to take care of the strains imposed upon them. When the cap is fitted to the tenon on the mast and the hole for the topmast is bored, it is a nice detail to put a thin metal band around the cap as was done in actual practice. Eyebolts should be in the cap to take the lower yard lifts and maybe another on the after side to take a headstay from an after mast. Now place the cap aside until the topmast is sent aloft; it will be put on the topmast then and stay there. Put on the iron hoops. Make them of thin strips of .003 brass oxidized and lap them on the after side and fasten with a small pin. Paper bands can be used but they do come off. Either paint the mast or varnish it and paint the grooves you cut, white. Various colors of paint were used, in later years what was known as mast white. Am not much on color, but will say it was in the range of light tan.

Now is the time to put on the deadeyes and futtock shrouds, for the topmast. Nearly missed two details..a so-called bolster should fit over the mast head and lay on the top. It was what the shrouds and stays rested on. We certainly must not forget the bib or paunch; a light piece of wood that stood on the fore side of hooped masts to keep the sails from wearing on the iron bands. This strip should be long enough to reach on the mast from below the truss iron to the extent of the drop of the sail. Top masts: make them of square stock, cut to length, cut the head and tenon square and leave at least a third of the doubling square before the mast is rounded off. Drill a hole thwart ship through the heel of the mast to take the fid. The fid is what keeps the mast from sliding down through the top. If the scale of the model is large enough cut a slot thwart ship just above the fid hole; this slot should be inclined slightly aft and will take a sheave that the top rope is rove through when the mast is sent aloft. Also a slot fore and aft through the top mast below the trestle trees to take a sheave for the topsail yard halliards. Round off the mast and slip on the cap you have already made. Make the trestle trees and cross trees and the futtock band for the topgallant shrouds. Be sure you have all of the metal fastenings in place. Make the cap for the topgallant mast and lay it aside as was done with the top mast cap. Your ship may have deadeyes for the topgallant shrouds or those shrouds may be set up on their own end. Whatever is necessary, put it on, at least the futtock shrouds. The only paint on a top mast was from the cap down and from its head down to the futtock band. Balance of mast should be left bright.

Top mast spreaders: these spreaders were constructed of either wood or metal and radiated out from aft of the top mast cross trees on which they rested and to which they were fastened. In some instances cross members used as bracing and lifts were employed as well, to support their outer ends. There were as many hooks on their outer edges, spaced accordingly, as there were backstays to be spred; usually three, for the skysail, royal and topgallant.

The topgallant masts: this most usually included the royal and skysail masts. In some cases a ship was rigged with fidded royal masts. In such a case the topgallant mast would be built similar to a topmast. Considering that this mast is to incorporate all three masts, cut the wood to the size and length, lay out the various mast lengths and bore the holes for a fid and the halliards while the wood is still in a square shape. Round off the mast leaving the heel square. Check the diameter as you go with a drill gauge plate. When the topgallant mast has been reduced to size, start sizing the royal. With the aid of a drill gauge just reduce the size of the royal about .010. By doing so and using a metal spider at the topgallant mast head to which to fasten the shrouds and stays, the stock won't be reduced as much as it ordinarily would be, had a stop been cut in the wood as a seat for that rigging. Using metal spider bands also tends to make neater looking work. Repeat these steps for the skysail mast. Slip the cap on and make metal spider bands. These fittings have been described and illustrated in former issues of the Journal. As to a truck: whatever your choice, spherical or flat. Rigging: don't see where anything can be gained by setting up the masts all assembled. Would prefer to set up one section at a time and think a better class of work can be obtained. By all means when a mast is set up, rattle it down, don't let it go until later. Rattling is a tiresome task but take it as it comes and don't let it get ahead of you. No mention has been made as to fixing yards to masts before the masts are set up. Hinged parrel bands were described in an article in a former Journal. Yards fixed to masts before rigging is completed are only in the way and liable to be broken. And start rigging the yards from the top down.

INTRODUCING NEW MEMBERS

Oliver B. Raser - 324 Fire Island Ave., Babylon, Long Island, New York. "Sailing and handling of small craft, study of piloting and navigation, history of sail and exploration, collecting and making ship models".

Ralph E. Cropley - Asst. Curator & Librarian, Seaman's Church Institute, 25 South St., N.Y. Mr. Cropley writes - "I am a retired sea captain after war service. Have the Cropley Collection in the Smithsonian, now grown to be the largest collection of ship reference data in the world with about 40,000 ship pictures, ship plans, etc. Has cost me $25,000 during 50 years of collecting. The Smithsonian has had it since 1934 and monthly it is being added to as long as I live. Cut my eye teeth down New England way sailing and racing 20 foot yachts. With Franklin D. Roosevelt for years made and raced small models across the Hudson at Hyde Park. Have made several hundred "portraiture" ship models, many of them are in F.D.R.'s museum at Hyde Park as well as the late King George VI of England and the Smithsonian. And now this new museum we have started at the Seaman's Church Institute in down town New York City -- we began six months ago with 15 ship models and now we have over 125. I have been a writer of sea articles. Over 200 of them are in the files of the Smithsonian as gifts of Franklin Roosevelt."

Robert Stanton Fox - Powder Point Duxbury, Massachusetts. "Tho' I was a Naval Architect for ten years on the Central Technical Staff of Bethlehem Steel Co., Shipbuilding Division, and involved in the design of modern merchant and naval vessels, to be followed by a private practice in yacht design and brokerage, my interest is primarily confined to sailing craft. The prodigious research and magnificent writings of Howard I.Chapelle and Marion V. Brewington have made it possible for me to pursue this interest, despite the lack of time to otherwise engage in it more actively. Log canoes and bugeyes hold a particular appeal and have owned a 42' 5" long log canoe which was, at an early date rebuilt as a Bugeye. Tho' 90 years old, she is still sound and will again be in service this summer, as a yacht (?)."

Charles H. Wertz, 517 Emerald Ave., Harrisburg, Pennsylvania. "My interests - square rigged vessels up to and including clippers. Particularly Spanish Galleons."

Richard G. Francois, 226 W. Alamar Ave., Santa Barbara, California. Mr. Francois is at present Commander of Admiral Bacon Camp No. 72, United Spanish War Veterans, and chairman of Patriotic Council of Santa Barbara County, California. We felt that we had to mention this first and now we can speak of Mr. Francois' nautical interests: "I am interested in plans, details and technical data on ships of 1600, 1700 and 1800 periods. Not so much interested in sea lore as I am in data showing construction , rigging, lines, deck plans, and ways and means for overcoming difficulties in model making."

Louis William Richardson, 1570 Westwood Ave., Cleveland 7, Ohio. "I have long been interested in marine history and design as it was in the days of sail. I am particularly interested in early water transportation on American lakes, rivers, and canals. While I could not now be classed as an active model builder, I hope to be in a position to do more of this in the future."

Change address of H. D. Huycke to North G. Street, Tacoma, Washington.
Correction: Last month we corrected the address of Midwest Model Ship Fitters over the phone to the typist -- now we have to correct it again -- the name is John J. O'Donnell who operates the Midwest Ship Model Supply and the address is 5704 Stoney Island Ave., Chicago, Illinois.

IN MEMORIUM

Entered into rest--January 23, 1954

HARRY LEROY STODDARD

ALMIGHTY FATHER, into Thy hands we commend the soul of our departed friend and shipmate. Harry was a charter member of the Guild and the San Francisco Group. Although he never crossed an ocean, he was a part of it in his great love of the sea. He was Secretary of the San Francisco Ship Owners Association and for many years was engaged in Marine Insurance. Harry passed away in his sleep.--James H. Willey,Secretary, San Francisco Group.

THE DIRECTORY OF SHIP MODEL PLANS

Mehrel Shank - Registrar

The Directory is a listing of the sources of Ship Model plans. I have not included in the list below the plans by H. I. Chappelle, due to the lack of space and the fact that lists of over 300 of the plans in his books can be easily obtained from his publishers. Below are some of the plans, the sources of which are recorded in the Directory.

SECTION II
NAVAN CRAFT

ADAMS, US, Sloop-of-War
ALABAMA, Conf. Raider
ALERT, Brit. Revenue Cut.
ALFRED, US, 1766
AMERICA, priv., 1812
ASTRALABE, Fr. Corv. 1811
BALTIMORE CLIPPER 1825
BELLE POULE, Fr. Frig 1834
BLAA HEYREN, Dan Frig
BOMB KETCH, Brit.
Bomb Vessel, Dut. 1750
BOXER, US Brig 1881
BRIG, Brit Gun 1798
BRIG, Brit 12 gun
CENTURION, Brit. 1740
CHEBEC, Fr. 24 gn 1750
CHRISTIAN V, Dan, 90 gn
CLEOPATRA, Brit, Frig
CORVETTE, 18 gn 1800
COURRONNE, Fr. 1636
Cutter, Fr. 1815
DAPPER TOM, Priv. 1815
DILIGENCE, Brit. Rev. Cut.
FAIR AMERICAN, US 1780
FREDRICK IV, Dan, 1699
GALEASE 2 mt
GALLEY 42 car
GALLEY, MALTESE, 1720
GLOUCHESTER, Brit. 1736
HARRIET LANE, US Pad Cut
HOLSTEIN, Dan 60 gn 1772
HOY, Brit
J. F. COOPER, US 1 gn Sch
JOSEPHINE, Fr Brig 1824
LARK, Priv. 1812
LEXINGTON, US Brig 1776
LICORNE, Fr. 50 gn 1690
LOUGEN, Dan Brig 1791
MAN O WAR, Dut 1665
MAN O WAR, Br 80 gn 1750
MAN O WAR, Fr 74 gn 1790
MAN O WAR, Vent 18th cen
MAN OR WAR , Dut 60 gn 1800
MAN O WAR, Br 74 gn 1813
MALEK ADHEL, US 1840
NIAGARA, US Brig 1812
NORSKE LOVE, DAN 1765
NORTH CAROLINA, 94 gn

OHIO, US 74 gn
ORESUND, Dan 70 gn 1765
PENNSYLVANIA, US 120 gn
PERRY, US Brig 1847
PRINCE, Br 1670
PRINS. CHR. FREDRICK
Dan 74 gn 1761
PRINZ FRED. Dan 70 gn
PROTECTEUR, Fr 1760
REALE, Fr Galley 1670
ROW GALLEY, US 1812
SLOOP DUTCH 1750
SOMMERS, US Brig
TOULONNAISE, Fr Sch
VALKYRIEN, Dan Corv
VICTORY, Br
WASHINGTON, US Rev Cut

SPRITSAIL TOPMAST ERA

BERLIN, Frig 1674
CHRISTIAN V, Dan 1673
COURRONNE, Fr. 1636
DERFFLINGER, Flute 1675
FREDRICK IV, Dan 1699
JOHANNA, Dut 17th cen
LICORNE, Fr 50 gn 1690
MAEGD VAN GHENT, Dut
Pinnace 17th cen
MAN O WAR, Dut 1665
PRINCE, Br. 1670
SOV OF SEAS, Br 1637
WAPPEN VON HAMBURG
Brandenburg 1667

OLD-TIME CRAFT and MISC.

ARK ROYAL 1588
BOEIER, BELGIUM
BOUNTY, 1787
BOURICHE, Turkish
BUSS, HERRING 1490
CARRACK 1480
CHINESE TRADING JUNK
CHINESE FREIGHT JUNK
COG, BR 1485

DOS AMIGOS, Slaver
EAGLE, Pinkey, 1820
EAST INDIAMAN, Dut
EAST INDIAMAN, Br
ELIZABETH JONES, Br
Galleon, 1586
ENDEAVOUR BARK, 1768
FELUCCA BARBARY
GALLEON, ELIZ.
GALLEY, GRECIAN
GOLDEN HIND, 1580
GONDOLA, Venetian
GREAT EASTERN
GREAT HARRY, 1514
HALF MOON, 1609
HERMINE, 1534
HOOGAERS, Belgium
IMPERIAL BARGE, Fr
KEEL, Ancient 1287
KETCH, Dut. 18th cen
KING'S SHIP, Br 1200
MAYFLOWER, 1620
MONITOR, US Ironclad
NINA, Caravel, 1492
PILGRIM, Brig
PINA, CARAVEL, 1492
REVENGE, Gal. 1590
ROMAN SHIP
SANTA MARIA, 1492
SEMAQUE, Flemish 1650
SHIP, Merchant 1532
SPANISH GALLEON 4 mt
VIKING LONGSHIP 900
WHALER, BARQUE AUX
WHALEBOAT, 1850
WHALEBOAT, BETTLE
WHALEBOAT, NEW BEDFORD
WARSHIP, Dut 1550
YACHT, Dut 1630
YACHT, Dut 1752
YACHT, Dut Desp 1800
YACHT, STUART 1674
ZULU, Fishing